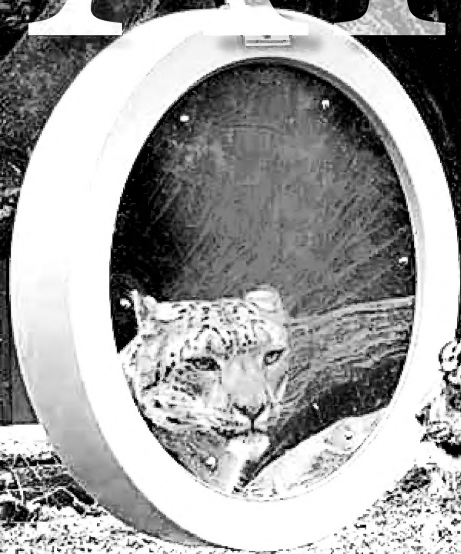


The Journal of the American Association of Zoo Keepers, Inc.

AKF Animal Keepers' Forum





learning
partner

ASSOCIATION
OF ZOOS &
AQUARIUMS

HOW

CAN YOU ADVANCE YOUR ZOOKEEPING CAREER?
With an online education from the Animal Behavior Institute.

Our programs in Zoo & Aquarium Science give you the training you need to grow and advance in your field.

Small class sizes and professional faculty guarantee you a personal education with the individual attention you deserve.



ANIMAL
BEHAVIOR
INSTITUTE

A more personal education

**START TODAY
AND EARN YOUR
CERTIFICATE
IN AS LITTLE
AS SIX MONTHS!**

Animaledu.com
support@animaledu.com
Toll free (866) 755-0448



101 ABOUT THE COVER

102 FROM THE PRESIDENT

105 COMING EVENTS

FEATURED ARTICLES

108-111

**Good Intentions: Are Zoos and Aquariums
Encouraging Visitors to Conserve?**
Rebeka Torlay

112-115

Chiropractor Visits a Neonate Tiger
Dawn Strasser

116-117

Smiles Across Many Miles and the Animal Connection
Ray Pawley

ENRICHMENT OPTIONS

118-122

Enrichment Through the Ages
Micaela Muniz, Megan Smith and Jennifer Elston

TREES FOR YOU AND ME

123-125

Trees For You and Me: What's that all about?
Dawn Fleuchaus



Discover what tens of thousands of customers including commercial reptile breeding facilities, veterinarians and some of our country's most respected zoos and aquariums have already learned: with Rodentpro.com®, you get quality AND value! Guaranteed.

RodentPro.com® offers only the highest quality frozen mice, rats, rabbits, guinea pigs, hamsters, ferrets, chickens, quail, live insects, and other foods and supplies at prices that are MORE than competitive. We set the industry standards by offering unsurpassed quality, breeder direct pricing and year-round availability.

We are confident that you will be truly pleased with the products and service you receive from RodentPro.com®. We will do whatever it takes to earn your business.

We guarantee it!

Order online!

www.RodentPro.com

It's quick, convenient
and guaranteed!

P.O. Box 118
Inglefield, IN 47618-9998

Tel: 812.867.7598

Fax: 812.867.6058

E-mail: info@rodentpro.com



Bottoms Up!



MISSION STATEMENT

American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This photo features Taza, a male snow leopard (*Panthera uncia*) at Lincoln Park Zoo in Chicago, IL. Taza is a pretty laid-back cat, preferring to spend most days napping outside on the high rocks in his habitat. He tends to engage with any type of enrichment that he is offered. This was his first time receiving the Looky Lou mirror (wildlifetoybox.com), and he was definitely intrigued. Taza currently resides at Potter Park Zoo in Lansing, MI, having been transferred there in May 2019 in preparations for renovations to the historic Kovler Lion House at Lincoln Park Zoo.

As one of the world's most elusive cats, snow leopards are well-equipped to thrive in some of the harshest conditions on Earth in the mountains of Central Asia. Long hind legs give them the ability to leap as far as 15 meters in distance, and about six meters high. Their wide, fur-covered paws act as natural snowshoes, while their long, flexible tail aids in balance and can also be wrapped around their body as protection from the cold. Their smoky grey coats with dark rosettes allow them to blend in perfectly with the rocky mountain slopes. There are between 4,000 and 7,000 snow leopards in the wild, but it is difficult to accurately assess the population due to the fact that snow leopards live in some of the most inaccessible areas and are very rarely seen, helping them to earn the nickname "ghost of the mountain". Snow leopards were previously listed as Endangered on the IUCN Red List, but were reclassified as Vulnerable in 2017. The main threats to their existence are poaching, habitat loss, and retaliatory killings. Cover photo by Allycia Darst of Lincoln Park Zoo.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

Articles printed do not necessarily reflect the opinions of the AKF staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

Items in this publication may be reprinted providing credit to this publication is given and a copy of the reprinted material is forwarded to the Editor. If an article is shown to be separately copyrighted by the author(s), then permission must be sought from the author(s). Reprints of material appearing in this journal may be ordered from the Editor. Regular back issues are available for \$6.00 each. Special issues may cost more.

MEMBERSHIP SERVICES

Animal Data Transfer Forms available for download at aazk.org. AAZK Publications/Logo Products/Apparel available at AAZK Administrative Office or at aazk.org.



ANIMAL KEEPERS' FORUM

TO CONTACT THE AKF EDITOR:

Shane Good, AKF Editor

P.O. Box 535, Valley City, OH 44280

330-483-1104

Shane.Good@aazk.org

AAZK Administrative Office

American Association of Zoo Keepers

8476 E. Speedway Blvd. Suite 204

Tucson, AZ 85710-1728

520-298-9688 (Phone/Fax)

CHIEF EXECUTIVE/FINANCIAL OFFICER:

Ed Hansen | Ed.Hansen@aazk.org

DIRECTOR of PROFESSIONAL DEVELOPMENT and CONFERENCE MANAGEMENT

Bethany Bingham, Bethany.Bingham@aazk.org

ANIMAL KEEPERS' FORUM - EDITOR

Shane Good, Shane.Good@aazk.org

GRAPHIC DESIGNER

Elizabeth Thibodeaux, Elizabeth.Thibodeaux@aazk.org

ENRICHMENT OPTIONS COLUMN COORDINATORS

Stephanie Miner, Julie Hartell-DeNardo,

Beth Stark-Posta, Beth Ament-Briggs

TRAINING TALES COLUMN COORDINATORS

Kim Kezer, Jay Pratte, Angela Binney

CONSERVATION STATION COLUMN COORDINATOR

Philip Fensterer

ANIMAL WELFARE COLUMN COORDINATORS

Stephanie Miner, Julie Hartell-DeNardo,

Beth Stark-Posta, Beth Ament-Briggs

BOARD OF DIRECTORS AND OVERSIGHTS

PRESIDENT: Paul Brandenburger, Paul.Brandenburger@aazk.org

VICE PRESIDENT - Conservation: Nicole Pepo, Nicole.Pepo@aazk.org

Ethics Chair

[Conservation Committee](http://ConservationCommittee)

Chair: Saul Bauer, Conservation@aazk.org

Vice Chair: Carrie Ellis, Conservation@aazk.org

[Bowling for Rhinos Program](http://BowlingforRhinosProgram)

Program Manager: Kym Janke, Kym.Janke@aazk.org

Vice Manager: Matthew Mills, BFR@aazk.org

[Trees for You and Me Program](http://TreesforYouandMeProgram)

Program Manager: Christy Mazrimas-Ott, Christy.Mazrimas-Ott@aazk.org

Vice Manager: Vacant

BOARD MEMBER - Education: Ellen Vossekuil, Ellen.Gallagher@aazk.org

[International Outreach Committee](http://InternationalOutreachCommittee)

Chair: Yvette Kemp, Yvette.Kemp@aazk.org

Vice Chair: Noah Shields, IOC@aazk.org

[AAZK Resource Committee](http://AAZKResourceCommittee)

Chair: Jenny Owens, ARC@aazk.org

Vice Chair - Loren Berry, ARC@aazk.org

BOARD MEMBER - Recognition: James Weinpress, James.Weinpress@aazk.org

[Awards Committee](http://AwardsCommittee)

Chair: Erika Defer, Awards@aazk.org

Vice Chair: Autumn Lindsey, Awards@aazk.org

[Grants Committee](http://GrantsCommittee)

Chair: Laura Chapman, Grants@aazk.org

Vice Chair: Stacie Bockheim, Grants@aazk.org

BOARD MEMBER - Regulation: Kristen Scaglione, Kristen.Scaglione@aazk.org

[Safety Committee](http://SafetyCommittee)

Chair: Sara Morris, Sara.Morris@aazk.org

Vice Chair: Kathryn Juliano, Safety@aazk.org

[Animal Welfare Committee](http://AnimalWelfareCommittee)

Chair: Megan Wright, Megan.Wright@aazk.org

Vice Chair: Tricia Gunther, BHC@aazk.org

[Bylaws Program](http://BylawsProgram)

Rebecca Filippini, Rebecca.Filippini@aazk.org

BOARD MEMBER - Communication: Abbie Doan, Abbie.Doan@aazk.org

[Communication Committee](http://CommunicationCommittee)

Chair: Joy Kotheimer, Communication@aazk.org

Vice Chair: Tianna Redieck, Communication@aazk.org

[National Zoo Keeper Week Program](http://NationalZooKeeperWeekProgram)

Program Manager: Jenna Schmidt, NZKW@aazk.org

Vice Manager - Audrey Harmon, NZKW@aazk.org



Spring is a season of rebirth with plants blooming and animal awakenings. The realm of animal care includes another new beginning as it sees the start of the summer intern search! Many of us began our careers as interns where we first learned the ropes of animal care, behavioral husbandry, and public education and we now oversee the next generation of professionals. The retrospective views of internships often focus on the hard work that many did as unpaid volunteers, but as the mentors to new interns we should aim high and expose them to every aspect of an ever-evolving profession.

Behavioral husbandry has evolved into an important focus for me as a mentor. I used to have interns observe my training sessions and give enrichment items to the animals. Training sessions now include instruction in the principle of positive reinforcement, understanding of the vocabulary associated with training, and teaching the skills to perform their own training sessions. Enrichment used to involve delivering approved enrichment, but now interns are given the opportunity to submit their own ideas for new items and build previously approved ones. The Animal Training Terms and Definitions document created jointly by AZA and AAZK has served as an excellent resource in this instruction.

Presentation skills are sometimes overlooked for intern development whether it be for peers or public interactions. *Animal Keepers' Forums*, both as hard copies and in the Biodiversity Heritage Library, as well as Conference Proceedings have numerous articles and presentations to look at as references for developing skills as well as examples of successful presentation skills. Keeper chats and other presentations are excellent opportunities to engage with guests, but don't overlook AAZK Chapter meetings or regional symposiums as platforms for developing public speaking opportunities amongst peers.

And as everyone reading this can hopefully attest, AAZK membership can grant access to a collection of knowledge, opportunities, and community that cannot be overlooked as a learning tool for anyone looking to get into the animal care profession. Student or affiliate memberships are excellent for interns to learn as much as possible and increase the professionalism of their resumes and interviews as they seek to transition from mentees to keepers to co-workers within the field.

Cheers,

Paul
Paul.Brandenburger@AAZK.org



***FINAL* Call for Paper & Poster Abstracts** **2020 AAZK National Conference**

46th Annual AAZK National Conference

Los Angeles, California

August 30 – September 3, 2020

Conference Theme: *"Lights, Camera... Take Action!"*

How to Submit Your Abstract for Consideration:

Visit the conference website for more information at www.aazk2020.org or email the AAZK Professional Development Team at PDC@aazk.org for a direct link to the Google Form. If you do not use the Google Form application, your abstract will not be reviewed. The deadline for submission of abstracts for Papers and Posters is ***May 1, 2020***.

Papers

Authors will be allowed 15 minutes for a presentation with five minutes of Q & A immediately following. If accepted, you may be scheduled to present your paper in the main ballroom, or you may be scheduled to present your paper during a concurrent, themed paper session which may have a more intimate setting.

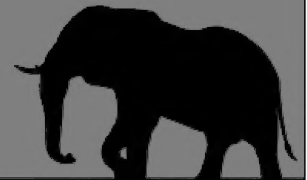
Posters

Posters will be on display throughout the Conference with a dedicated Author Session scheduled for the evening of September 1st. Prior to the Author Session, posters will be judged by members of the AAZK Professional Development Team on criteria such as adherence to the conference theme, innovation, and poster layout and organization. Certificates will be awarded to the top three highest scoring posters during the Conference Awards Ceremony immediately following the Poster Author Session.

The AAZK Professional Development Team will notify authors of acceptance of their paper or poster abstracts via email, no later than **June 1, 2020**.

Thank you for your support for the conference program!

Recon



Advancing Elephant Welfare Through Training and Management Cheyenne Mountain Zoo, July 2020

Advancing elephant welfare means addressing some big challenges. RECON is the workshop specially designed to help elephant care professionals meet those challenges by improving your knowledge of behavior-change science and strengthening your training skills. Each day, participants will engage in stimulating lectures with open discussions where your voice will be encouraged and respected, as well as training practice with individualized feedback with elephants and other model species.

Be part of the growing solutions by growing your knowledge and skills. Join us at the Cheyenne Mountain Zoo for a game changing opportunity.

Dates:	July 27-29, 2020 (Optional Zoo Day July 30 th)
Location:	Cheyenne Mountain Zoo, Colorado Springs, Colorado, USA
Speakers:	Steve Martin, Dr. Susan Friedman, Mike McClure, and CMZ's elephant team
Target Audience:	Program managers, elephant trainers, and other elephant care professionals
Registration:	\$500 (\$250 reservation deposit + \$250 final payment) Includes daily transportation to and from the hotel, lunches, snacks, note guides and more.
Participants:	Limited to 15 participants

For more information and to submit an application for the workshop, visit the website at:
<https://www.cmzoo.org/recon-elephant-workshop/>

With generous support from the Cheyenne Mountain Zoo

COMING EVENTS

Post upcoming events here!
e-mail shane.good@aazk.org

May 4-8, 2020

Practical Zoo Nutrition Management

Front Royal, VA

Hosted by Smithsonian-Mason School of Conservation
smconservation.gmu.edu/programs/graduate-and-professional/practical-zoo-nutrition-management/

May 11-14, 2020

4th Annual International African Painted Dog Conference

Missouri Department of Conservation Powder Valley Conference Center.

For more information go to:
www.endangeredwolfcenter.org/blog/4th-annual-international-african-painted-dog-conference/

June 8-12, 2020

Level Up: Zoo Animal Behavior Workshop

West Palm Beach, FL

Hosted by Palm Beach Zoo and Conservation Society

For more information go to:
www.palmbeachzoo.org/new-level-up-animal-training-workshop

June 22-26, 2020

Zoos and Aquariums Committing to Conservation

Salt Lake City, UT

Hosted by Utah's Hogle Zoo and Tracy Aviary

For more information go to:
zaccconference.com/

July 18-25, 2020

Felid TAG Annual Conference

Berkeley, California

Hosted by Oakland and San Francisco Zoos

For more information go to:
<http://www.felidtag.org/>

July 27-29, 2020

RECON Elephant Workshop

Colorado Springs, CO

Hosted by Cheyenne Mountain Zoo

For more information go to:
cmzoo.org/recon-elephant-workshop/

September 13-17, 2020

AZA Annual Conference

Columbus, OH

Hosted by the Columbus Zoo and Aquarium

For more information go to:
aza.org/conferences-meetings

September 27-October 2, 2020

Giraffe Care Workshop

Colorado Springs, CO

Hosted by Cheyenne Mountain Zoo

For more information go to:
cmzoo.org/giraffe-care-workshop/

October 18-22, 2020

Otter Keeper Workshop 2020

Miami, FL

Hosted by Zoo Miami

For more information go to:
www.otterkeeperworkshop.org/



**AMERICAN
ASSOCIATION
of ZOO KEEPERS**

**August 30 - September 3
2020**

AAZK National Conference

Los Angeles, CA

Hosted by Los Angeles AAZK Chapter and Los Angeles Zoo

www.aazk2020.org

February 9-12, 2021

Save the Date!

International Congress of Zookeepers

Wellington, New Zealand

For more information go to:
www.iczoo.org/



AUSTRALIAN OUTBACK PLANTATION

No Worries Mate!

Zoo Animal Browse Specialists

◆ Arizona Grown Year Round Supply

◆ Shipments Twice Weekly

Overnight Air - Ground Transportation

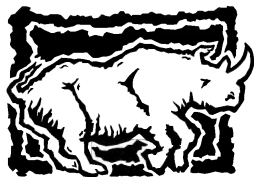
◆ Pear ◆ Ash ◆ Elm ◆ Mulberry ◆ Ficus ◆ Olive ◆ Brachychiton

◆ Acacia ◆ Callistemon ◆ Eucalyptus ◆ Enrichment Sticks

Paul D. Chambers, C.H. 623-780-8500

AustralianOutbackPlants@gmail.com - www.australianoutbackplants.com

World's Most Extensive Eucalyptus Browse Plantation

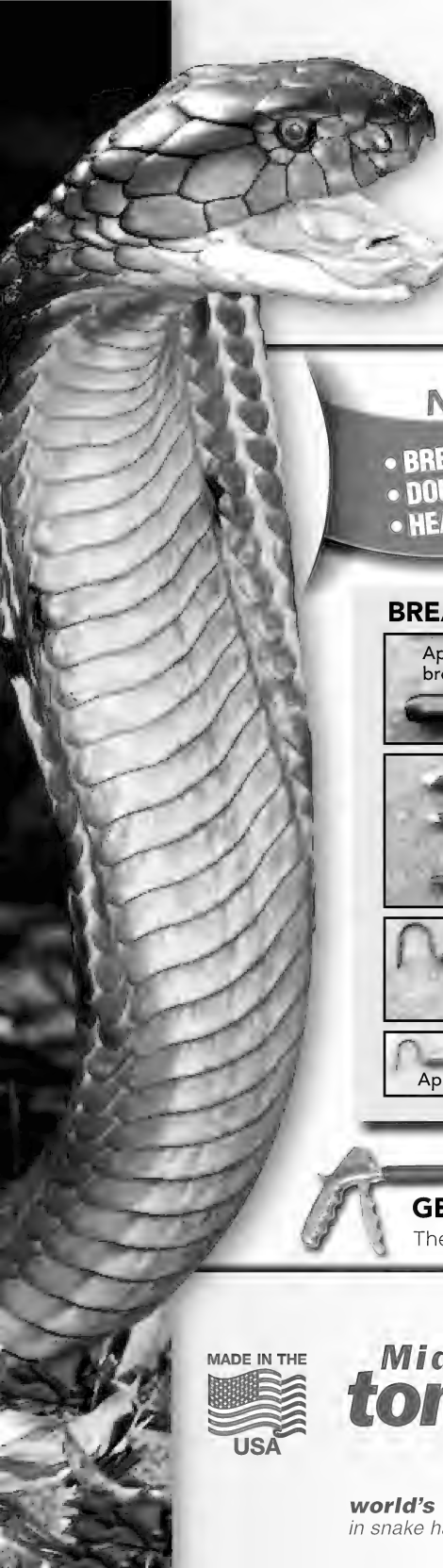


**AMERICAN
ASSOCIATION**
of ZOO KEEPERS

Membership with the American Association of Zoo Keepers includes a subscription to the *Animal Keepers' Forum*, member rates for AAZK events and products, access to the Members Only section of aazk.org, plus much more!



JOIN TODAY at AAZK.ORG



Midwest Tongs has a complete line of

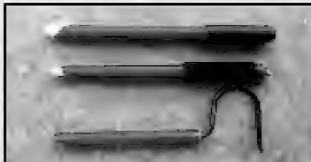
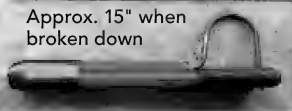
Reptile Handling Equipment

NEW!

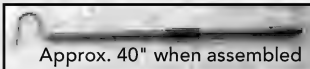
- BREAKDOWN HOOK
- DOUBLE HOOK
- HEAVY-DUTY PRO FIELD HOOK

BREAKDOWN HOOK

Approx. 15" when
broken down



Approx. 40" when assembled



HEAVY-DUTY PRO FIELD HOOK

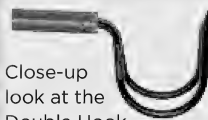


Designed and
manufactured
in-house, Midwest
Tongs has versatile
uses for its equipment
and for any type of
situation you don't
want your hands to
get near. Made
in the USA.

DOUBLE HOOK



Close-up
look at the
Double Hook.



GENTLE GIANT TONGS™

The most humane tong on the market.



Midwest
tongs
.com

1-877-US-TONGS
TONGS.com



world's leader
in snake handling equipment

Good Intentions: Are Zoos and Aquariums Encouraging Visitors to Conserve?

*Rebeka Torlay, Bird and Mammal Trainer II
Downtown Aquarium
Houston, TX*

Abstract

There are many factors that cause conservation intent to change behavior, but there is a gap that exists between these two concepts. Research indicates that while simply increasing guest knowledge of conservation issues is not enough to encourage conservation behavior, other tools such as live animal demonstrations and using additional resources to follow up with guests after a zoo or aquarium visit can be very effective in encouraging conservation behavior. An analysis of literature was performed that focused on increasing conservation knowledge and encouraging conservation behavior in guests of zoological institutions. The analysis found that measuring the intention to perform a behavior can be used as a representation of actual behavior performed when it is impossible to measure behavior directly, but it is not always the most reliable measure, and there are other methods to predict behavior that could be beneficial to the field.

Introduction

Modern zoos and aquariums have progressed from being places solely for entertainment to informal education institutions that focus heavily on conservation education (Anderson, et al., 2003; Ardoin, et al., 2016). As conservation education institutions, one of the most important things that zoos and aquariums do to keep in line with their mission statements is to encourage their visitors to do things in their own lives that are beneficial for the environment - also known

as pro-environmental behaviors. To help in their conservation efforts, accredited zoos, aquariums, and other similar institutions have become huge proponents of informal education to raise awareness and increase guest knowledge on environmental/conservation issues (Ardoin, et al., 2016; Schmidt & Beran, 2016) with the hopes of encouraging guests to take action in their own lives after they leave zoo or aquarium grounds (Anderson, et al., 2016; Ardoin, et al., 2016). They recognize that human behavior is the most powerful threat to the environment (Veríssimo, et al., 2017).

When considering the idea of pro-environmental behavior, it is important to acknowledge that there is often a gap between environmental knowledge and awareness and the behavioral changes that benefit the environment (Ardoin, Schuh, & Khalil, 2016; Kollmuss & Agyeman, 2017; Veríssimo, et al., 2017). Actions and behaviors that benefit the environment or have some kind of environmental conservation benefit will hereafter be referred to as “pro environmental behaviors”, or “conservation actions” in this review (Ardoin, et al., 2016; Veríssimo, et al., 2017).

There are several factors that influence people’s environmental attitudes and tendency to perform conservation behaviors. These factors include education level (Newman & Fernandez, 2015; Kollmuss & Agyeman, 2017), political affiliation (Feinberg & Willer, 2012; Newman & Fernandez, 2015),

gender (Kollmuss & Agyeman, 2017), economic factors (Kollmuss and Agyeman, 2017), values, environmental awareness, and attitudes (Kollmuss & Agyeman, 2017; Newman & Fernandez, 2015). Research suggests that attitudes and perceptions about issues cannot always be changed in a short amount of time (Hacker & Miller, 2016). Even subtleties such as how the conservation messaging is framed when it is explained can have an effect on whether or not people will be receptive to the messaging (Feinberg & Willer, 2012; Haidt, 2013; Monroe, 2003).

The purpose of this literature review is to answer the question, “Are zoos and aquariums effective at inspiring behavioral change in guests that leads to performance of conservation actions?” This idea of a distinction between behavioral intention and performance of the behavior is based on Kollmuss & Agyeman’s (2017) recent work that suggests there is a gap between having the intention of performing pro-environmental behavior and the actual performance of the behavior.

Methods

Literature was chosen on the basis that the study had to be conducted in a zoological setting, such as a zoo, aquarium, or similar institution that promotes conservation education. For purposes of this analysis, conservation behavior was defined as an action that an individual was capable of taking to positively impact the environment, ecosystems, or wildlife in some way. Examples include donating to

conservation non-profits, writing messages to legislators to encourage environmental protection legislation, or changing consumer behavior to purchase products that don't contribute to habitat destruction. To find the literature, Google Scholar, Researchgate, and Miami University Library Online were used. The initial search terms were "conservation behavior" and "pro-environmental behavior". To further narrow the results, the terms "zoo" and "aquarium" were added to find literature that specifically covered studies done in zoological institutions. Literature that focused on measuring the intentions of guests to perform conservation behaviors or that encouraged guests to take some kind of conservation action were used. Any conservation behavior that fit under the first criteria was acceptable to use in this review. The selected articles were reviewed to determine whether zoos and aquariums were encouraging guests' intention to take conservation action or empowering their guests to modify their behavior to take conservation action.

Literature Review **Zoos & Aquariums**

Zoos and aquariums can use a variety of tools to achieve their goals of encouraging their guests to take conservation action, such as interactive animal encounters (Anderson, et al., 2003; Ballantyne & Packer, 2011; Hacker & Miller, 2016; Povey, 2002; Skibins, Powell, & Hallo, 2013) informative talks by interpreters or keepers (Anderson, et al., 2003), and informative signage (Anderson, et al., 2003; Hacker & Miller, 2016). Measuring the effect of these tools on guest behavior poses a challenge. Once guests end their visit, it is impossible to directly observe their behavior (Ballantyne, et al., 2007) and determine if it was affected by their visit. In lieu of being able to directly measure guest behavior, studies measure behavioral intent, hereafter referred to as "conservation intent." Most studies analyzed in this literature use indirect measures, such as self-reported behavior from the guests. Surveys were a popular method of obtaining this information from guests.

While the literature is generally in agreement about some of the variables

that can be used to determine whether someone will be willing to perform conservation behaviors, it is unclear to what degree these factors can be used as effective predictors of environmental behavior. For example, Kollmuss & Agyeman's (2017) study found that gender and level of education were generally good predictors of environmental concern, but the Ardoin et al. (2016) study did not find a significant correlation between education level and performance of environmental behavior. Interestingly, environmental knowledge was not classified as a reliable predictor for people performing conservation actions (Kollmuss & Agyeman, 2017). More research in this area is needed to determine what variables might lead people to perform conservation actions. It is also important to acknowledge that there is often a gap between environmental knowledge and awareness and pro-environmental behavior (Ardoin, Schuh, & Khalil, 2016; Kollmuss & Agyeman, 2017; Verissimo, et al., 2017).

The Skibins et al. (2013) study showed that viewing wildlife in a captive setting encouraged guests to care about conservation, which they determined to be a good predictor of conservation behavior. This idea of "conservation caring" being a good predictor of conservation behavior is supported by Swanagan (2010), who claims that guests who attended a presentation with live elephants were more likely to self report that they supported elephant conservation. Swanagan (2010) states that guests need to make a personal connection to conservation issues to feel motivated to perform conservation behaviors.

Tools available for education

Live animal presentations are used



across many facilities as they are a popular draw for guests to visit zoological institutions (Anderson, et al., 2003). Examples include a training demonstration, or an encounter with an ambassador animal, which is an animal that can be viewed in closer proximity by guests, usually outside of an exhibit. These types of presentations help zoological institutions to reach their goals of engaging and educating guests. Studies have shown that live animal presentations have greater audience engagement (Anderson et al., 2003; Povey, 2002) and increase guest knowledge (Hacker & Miller, 2016; Povey, 2002; Skibins, et al., 2013) more than simply listening to an educational talk without the aid of live animals or just reading educational signage (Anderson, et al., 2003). These presentations have also been shown to increase caring about conservation issues and encourage conservation behavior (Skibins, et al., 2013).

In addition to "up-close" animal encounters, other types of guest experiences, such as training demonstrations and keeper talks, can be

beneficial in altering guest perceptions and encouraging conservation behavior (Anderson, et al., 2003; Schmidt & Beran, 2016). The Anderson et al. (2003) study found that guests stayed more than twice as long at an otter exhibit when keepers gave a training demonstration with interpretation. This is relative to simply reading the exhibit signage, or keeper interpretation without the demonstration. Guests seem to enjoy when animals display natural behaviors and watching a training session gives them the opportunity to enjoy watching those natural behaviors. Guests at the San Diego Zoo who saw the elephants performing a wide variety of natural behaviors were more likely to report high conservation intent (Hacker & Miller, 2016).

However, Hacker and Miller's (2016) study could not draw a similar conclusion from guests who listened to the Elephant Keeper Talk, despite predicting a similar result. By their measures, guests who listened to the "Elephant Talk" did not show a significant relationship between listening to the talk and their conservation intent. It is possible that the lack of a significant relationship

could have something to do with the duration of time visitors remained at the exhibit to listen to the talk. The Anderson et al. (2003) study found that guests who listened to an interpretive talk at an exhibit only stayed there about half as long as when there was a training demonstration either with or without interpretation occurring.

From the literature analyzed it appears that live animal demonstrations are one of the most effective tools that zoological institutions can use to engage guests and have them create those personal connections that are so necessary to eliciting conservation behavior in their lives. This is not to say that keeper talks and educational signage aren't helpful, they simply appear not to be the most effective tool available (Anderson, et al., 2003; Hacker & Miller, 2016)

Guests: Knowledge, Connection, Experience

Adelman, et al. (2000) found that many visitors who were surveyed before they entered National Aquarium in Baltimore had a working knowledge of well-known conservation issues and the importance of those issues. This suggests that one of the reasons that guests visit zoos and aquariums could be an interest in conservation issues or awareness of their importance.

Hacker & Miller's (2016) research also showed that members of the San Diego Zoo were more supportive of conservation efforts and were more concerned about humans modifying nature than other visitors were.

Members might have expanded knowledge from being able to visit the zoo often, or they might have become members because of an interest in conservation. This relationship is endogenous by nature. Having previous knowledge of these issues might help the guests to make

deeper connections with wildlife and encourage them to take conservation action by expanding their existing knowledge (Buddefeld & Van Winkle, 2016).

Ballantyne & Packer (2011) claim that exposing guests to information after their zoo or aquarium visit that models conservation actions is a very effective way of encouraging actual behavior change and not just conservation intent. They refer to these follow-up resources as "post-visit action resources" (Ballantyne & Packer, 2011). One example of using "post-visit action resources" was in Buddefeld and Van Winkle's (2016) study. The resources used in this study were e-mails containing information about climate change and the impact on polar bears, which expanded on the information that guests received during their zoo visit. These resources also contained information on actions that guests could take to limit their carbon dioxide emissions for the sake of reducing the damage caused by climate change and were helpful in expanding guest knowledge on the topic of climate change and making them feel positive about their own impacts (Buddefeld & Van Winkle, 2016). Buddefeld & Van Winkle (2016) suggest that learning experiences need to challenge and expand guest knowledge in a way that also relates to their lives to have a meaningful experience and "post-visit action resources" can aid in that. Despite this, it was uncommon for researchers to follow up with guests after their visit. Providing guests with additional resources after their visit should be encouraged more because there is some evidence to suggest that it is challenging to change people's perceptions on issues in a short amount of time (Hacker & Miller, 2016). Providing additional materials post-visit would grant longer exposure to the conservation issues in question and give the zoological institution a better shot at altering someone's views on conservation and also ideally their behavior.

Although one of the most important goals of the conservation education programs at zoos and aquariums is to encourage guests to use the knowledge that they gain to perform conservation actions after they leave zoo or aquarium



grounds, the gap between intention and behavior can be a roadblock when it comes to creating meaningful change in behavior. (Kollmuss & Agyeman, 2017). Some studies in this review measured conservation intent in guests after experiencing an educational presentation. Anderson's (2003) study was similar in that it measured guest perceptions at an otter exhibit and found that guests had the highest levels of engagement and knowledge retention during the otter training demonstration that had an educator interpreting the session.


Conclusion

Without being able to directly measure guest behavior change after a zoo or aquarium visit, these institutions can use measurements of conservation intent as a stand-in, with the hopes that it will become conservation behavior. Relying heavily on guests to self-report their behavior can be an unreliable source of information due to outside pressures, but in the absence of the ability to take direct measures, it is an acceptable method for collecting data. Research does suggest that there is a gap between conservation intent and actual, meaningful behavior change (Kollmuss & Agyeman, 2017). For future research it could be useful to use behavioral models to try to predict guest behavior rather than always relying on self-reported behavior, such as the Dierking, et al. (2004) study. Although this study suggested a more sensitive behavior model to predict guest behavior, it still presents the possibility for using different methods for predicting guest behavior.

Although it is not always easy for keepers and educators in zoological settings to make meaningful connections with guests, it seems that it is beneficial to communicate with guests about what kinds of conservation actions they might already be taking to encourage them to add more conservation behaviors to their daily routine for the sake of benefitting wildlife. For example, if a keeper sees a guest using a reusable shopping bag instead of a plastic one, they might suggest to that guest to reduce or eliminate their use of single use plastic straws, which would also reduce their plastic usage. This idea is

based on the Ardoin, et al. (2016) work that indicates that people are likely to take additional conservation action if they already perform conservation behaviors in their life.

Many studies done in zoological settings show that zoos and aquariums do not rely solely on disseminating knowledge or resources as a way of encouraging conservation behavior. There are many tools that these institutions use to convey conservation messaging to guests. Presentations that involve live animals appear to be one of the most effective tools for engaging guests and encouraging conservation behavior. The literature shows that while gaining knowledge about wildlife and conservation issues can be helpful in shaping the intention to perform conservation actions, it is not necessarily a good predictor of people's performance of those behaviors.

It is clear from the literature that simply visiting the zoo or aquarium is not enough to change behavior, but that is not to say that educators and keepers shouldn't make the effort to educate guests at all. The Adelman et al. (2000) work suggests that many guests who visit zoos and aquariums might already have some knowledge of conservation issues and an interest in them. It would be extremely beneficial to expand the knowledge of guests like those and encouraging them to use that knowledge to benefit the environment. 

References

- Adelman, L.M., Falk, J.H., and James, S. 2000. Impact of National Aquarium in Baltimore on visitors' conservation attitudes, behavior, and knowledge. *Curator: The Museum Journal* 43(1):33-61.
- Anderson, U.S., Kelling, A.S., Pressley-Keough, R., Bloomsmith, M.A., and Maple, T.L. 2003. Enhancing the zoo visitor's experience by public animal training and oral interpretation at an otter exhibit. *Environment & Behavior* 35(6):826-841.
- Ardoin, N.M., Schuh, J.S., and Khalil, K.A. 2016. Environmental behavior of visitors to a science museum. *Visitor Studies* 19(1): 77-95.
- Ballantyne, R., and Packer, J. 2011. Using tourism free-choice learning experiences to promote environmentally sustainable behaviour: the role of post-visit 'action resources'. *Environmental Education Research* 17(2):201-215.
- Ballantyne, R., Packer, J., Hughes, K., and Dierking, L. 2007. Conservation learning in wildlife tourism settings: Lessons from research in zoos and aquariums. *Environmental Education Research*, 13(3): 367-383.

- Balmford, A., Leader-Williams, N., Mace, G.M., Manica, A., Walter, O., West, C., and Zimmermann, A. 2007. Message received? Quantifying the impact of informal conservation education on adults visiting UK zoos.
- Camargo, C., and Shavelson, R. 2009. Direct measures in environmental education evaluation: Behavioral intentions versus observable actions. *Applied Environmental Education & Communication* 8(3-4):165-173.
- Dierking, L.D., Adelman, L.M., Ogden, J., Lehnhardt, K., Miller, L. and Mellen, J.D. 2004. Using a Behavior Change Model to Document the Impact of Visits to Disney's Animal Kingdom: A Study Investigating Intended Conservation Action. *Curator: The Museum Journal* 47:322-343.
- Feinberg, M., and Willer, R. 2012. The moral roots of environmental attitudes. *Psychological Science* 24(1):56-62.
- Hacker, C.E., and Miller, L.J. 2016. Zoo visitor perceptions, attitudes, and conservation intent after viewing African elephants at the San Diego Zoo Safari Park. *Zoo Biology* 35(4):355-361.
- Haidt, J. 2013. *The righteous mind: why good people are divided by politics and religion*. London: Penguin Books.
- Kollmuss, A. and Agyeman, J. 2017. Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental Education Research* 8(3):239-260.
- Monroe, M. 2003. Two Avenues for Encouraging Conservation Behaviors. *Human Ecology Review* 10(2):113-125.
- Newman, T.P., and Fernandes, R. 2015. A re-assessment of factors associated with environmental concern and behavior using the 2010 General Social Survey. *Environmental Education Research* 22(2): 153-175.
- Povey, K.D. 2002. Close encounters: The benefits of using education program animals. Unpublished manuscript.
- Schmidt, L., and Beran, M. 2016. You otter know: Assessing guest learning and perception of North American river otter experiences. *Working paper*.
- Skibins, J.C., Powell, R.B., and Hallo, J.C. 2013. Charisma and conservation: charismatic megafauna's influence on safari and zoo tourists' pro-conservation behaviors. *Biodiversity and Conservation* 22(4):959-982.
- Swanagan, J.S. 2010. Factors influencing zoo visitors' conservation attitudes and behavior. *The Journal of Environmental Education* 31(4):26-31.
- Thøgersen, J., and Ölander, F. 2006, 07. To what degree are environmentally beneficial choices reflective of a general conservation stance? *Environment and Behavior* 38(4):550-569.
- Verissimo, D., Bianchessi, A., Arrivillaga, A., Cadiz, F.C., Mancao, R., and Green, K. 2017. Does it work for biodiversity? Experiences and challenges in the evaluation of social marketing campaigns. *Social Marketing Quarterly* 152450041773480.



Chira at 14 weeks

Chiropractor Visits a Neonate Tiger

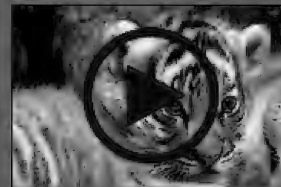
*Dawn Strasser
Head Keeper Neonatal Care and Quarantine
Hand Raising Resource Center Advisor,
Cincinnati Zoo and Botanical Garden*

On 2 February 2017, a four-year-old Malayan Tiger, *Panthera tigris jacksoni*, gave birth for the first time to 0.3 cubs. Her initial reaction to the parturition event was something no one had seen before or expected; she was trying to move away from the cub emerging from the birth canal and in the process of flicking her tail, propelled the cub onto the floor. The pair were monitored on camera for thirty minutes, during which time the dam sniffed the cub, but refused to clean it, then abandoned it. During this same time, the cub was observed breathing but did not have normal movement for a neonate. The Curator of Mammals and Veterinarian made the decision that intervention was warranted for the safety and health of the cub.

When the cub ("Chira") arrived at the Nursery it initially looked good, just cold (core temperature 79.12°F) and wet, so we proceeded to tie the umbilical cord and begin to warm it up. Meanwhile, the dam proceeded to give birth to two additional cubs and repeated her pattern of sniffing them, not cleaning them and then abandoning them. We decided to remove these cubs for hand-raising as well. The two (later) cubs were vigorous and had strong sucking response, however it was noted that

the first-born cub could not hold up her neck. Upon closer examination, it was determined that "Chira's" neck was abnormally positioned at a 45° angle off her back, so we proceeded to start manipulating the neck slowly in an attempt to get it back into a "normal position". However, when she would lay on her side, her neck would be over her back resulting in whining or screaming vocalization and the inability to move her head in a normal manner or hold in a normal position. When she was fed, she would do so in a slow and steady manner and would assume an unusual posture of pushing her head into the palm of my hand. As feedings continued, her response was getting softer and she was not as vigorous as her littermates which were active or moving their legs during nursing. The CBC and I-STAT analysis results were all within normal parameters and the physical examination of heart and lungs were unremarkable, but she continued to be listless. Nothing was amiss except for the slight head tilt to the right; by the time she was 24-hours-old we had been able to return the head to a normal position (90° angle) for a short timeframe with only a slight head tilt to the right. Even though by all standards the cub appeared normal, she was not thriving and meeting her physical

View an adjustment at
<https://www.youtube.com/watch?v=yiljr1FkBOc>



milestones such as suckling and active movement. It appeared, from my experience, that "Chira" was "a failure to thrive baby" meaning that although we can't find anything medically wrong she is clearly not thriving.

As luck would have it, I had an appointment with my chiropractor, Dr. Mark Sperbeck, D.C. DACO, that afternoon, and we were discussing this unusual head positioning when he remembered a six-month-old baby who was failing to thrive. His physicians did everything they could but the infant continued to deteriorate. The infant's father, a chiropractor, was holding his baby and began to check him out when he discovered that the C1 in his neck was out of alignment. Making an adjustment on his child, the father commented that the baby seemed to be reborn again, meaning he started to meet his physical milestones like a new born. He informed me that 95% of the nerve impulses travels through this small C1 vertebra to the rest of the body. Dr. Sperbeck is not only a licensed chiropractor, but has a historical background working on horses and dogs since 2003, under the supervision of a veterinarian. So, at 48 hours the cub was in obvious decline with no causative factors able to be determined, I went to our veterinarian with the information regarding spinal alignment from my chiropractor and convinced him to try something new. Being willing to think outside of the box is how we ended up having a chiropractor come evaluate a tiger cub.

When Dr. Sperbeck arrived, I had him examine another cub first so he would

Chira at one-day-old





Chira at four-days-old

have a point of reference before looking at "Chira". He proceeded to manipulate her neck utilizing chiropractic techniques and he palpated restrictions in lateral bands on both sides. With the avitator, an instrument that chiropractors use to apply pin point pressure to a spot, he adjusted the C1 BL and C3 BR (meaning the body of the vertebra C1 and C3 to the left and right side) with 4 oz. of pressure from the avitator *see figure 1*. I noticed almost immediately that "Chira" appeared more relaxed and had stopped crying. In addition, at her next feeding she readily began to nurse and was even heard chuffing. We felt that her body needed to heal and not disturb the re-alignment, so we shifted her to an isolated area so any movement from her siblings could not jeopardize the process and for the next 24 hours all she did was nurse and sleep. Dr. Sperbeck informed us that the soft tissue that was damaged at birth might take six to eight weeks to heal. He felt she would probably take four or five adjustments within an eight-week timeframe to maintain proper alignment. So, we continued to monitor

her and contacted Dr. Sperbeck when her behavior and/or posture indicated that an adjustment might be needed. There is no written manual for this procedure. I am using my experience from being around neonates and good observation skills to monitor her. Neonates will tell us what they need if we just learn to listen to them.

After the adjustment, "Chira" was starting to be a little more mobile like a newborn cub, but obviously not as developed and strong as her siblings. We permitted her interaction and playtime with her siblings but when she became tired she was removed for sleeping. By the time she was six-days-old (three days after adjustment), she had a noticeable head tilt again, poor suckling response, was no longer chuffing, and had resumed crying. Dr. Sperbeck was notified and he came for another adjustment (<https://www.youtube.com/watch?v=ylljr1FkBOc>). This time he palpated restrictions in lateral band and extensions, meaning her neck did not have full range of motion and there was stiffness in her back.


When he first examined her at three days of age he was primarily focused on the neck since that was her main source of discomfort. And, with any adjustment, you cannot proceed too quickly or make too many changes at one time, the body needs to relax, heal and renew before the next obstacle can be attacked. Since "Chira's" body was growing at such a fast rate; he needed to make small adjustments at a time. The second adjustment was made to C1 and C3 both BR (body right side of vertebra) and T12 and L3. While he was doing his examinations, Dr. Sperbeck explained that you feel "resistance" or lack of mobility when you apply slight pressure to the vertebrae. This is where you make your adjustments. We questioned him about getting an x-ray of the area prior to, and after, an adjustment. However, we were informed that you could lay these images on top of each other and they would appear the same since the picture is only a one-dimensional view. The area may appear to be in the correct position on the x-ray but does not take into account freedom of movement, or range

of motion, only placement within the column. It would be like taking a photo of a door hinge. The hinge might appear shiny and gray in appearance, but there is no way to tell if it moves freely, much like the vertebra.

After the adjustments, we let her rest for a day and initiated some physical therapy. Her therapy involved scratching her behind an ear and/or under the chin resulting in her pushing into our hands thereby strengthening muscles as she grows. At this point, she was still behind her siblings in motor skills, such as weaker in crawling and not able to climb up on low, soft objects, etc. At 12 days of age, the head tilt resumed and she was observed sleeping in an abnormal posture in an attempt to get comfortable. While she was still nursing normally her behavior and demeanor had slightly shifted to the point I felt Dr. Sperbeck needed to be called again. During this visit, the adjustments were SI R, T10 BL, T6 BR, T1, C1, BL, C2, and BR. All adjustments were based solely on the cub's reaction.

As "Chira" continued to grow and heal, the adjustments did not need to occur as frequently (fourth adjustment was not required until after eight days from her third adjustment). The fourth adjustment came after we observed a noticeable change in her locomotion and mobility. This adjustment was C1 BR and C2 BL. "Chira's" final appointment occurred at 11 weeks of age and required C1 BR, (L) SI adjustment. This was accompanied by a complete follow up by the veterinarian at which time her case was released from active care.

"Chira" and her siblings were moved to a larger enclosure at twelve weeks of age and all are adjusting to the new area. To help build their confidence in this new area, "Blakely" (nursery canine) and I would spend time daily socializing and playing with them while in their new area. Of course, tiger cubs will be adventurous and on their fourth day in the new area "Chira" struck her head on the wall of the enclosure. She knocked herself out for a period of time, then staggered briefly and went on her way in a somewhat normal manner but her behavior indicated something was wrong. As time progressed, the head tilt returned and Dr. Sperbeck stopped by to adjust this 25 pound tiger. He had joked in the very beginning "how long do you think we can adjust this two pound cub" and my reply was "as long as we can". So this time, since she no longer fitted into the cradle of our hands, we used a favorite toy to distract her while she laid across my lap for what turned out to be her last adjustment.

Personally, I felt that Dr. Sperbeck's adjustments were integral to her well-being and if he had not made these adjustments to "Chira" she would not have been alive today, so for that I thank him. 

Works Cited

- Kuechle, M. 2017. Chira. Cincinnati Zoo
Mastrullo, J. 2017. Chira. Cincinnati Zoo
Newton, K. 2017. Chira. Cincinnati Zoo
Ryan, T.J. 2005. Chart of Effects of
Spinal Misalignments." www.unityfamilychiropractic.com, Chart_of_Spinal_Misalignments.
Strasser, D.A, and M.J. Sperbeck, 2017.
"Chiropractic Adjustment on Neonates."

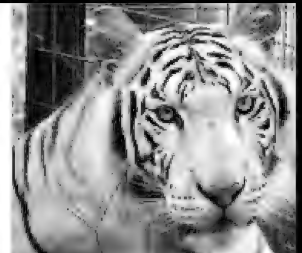
BIG CAT INTERNSHIPS AVAILABLE



Join us in

"Saving Tigers One by One"
As seen on Animal Planet®
"Growing Up Tiger"

Learn about Big Cat Management. Internship involves
Animal Care Apprenticeship and Public Education.
We offer experience that counts towards employment.



TIGER MISSING LINK FOUNDATION • TIGER CREEK WILDLIFE REFUGE • Apply at: www.tigercreek.org

Smiles Across Many Miles and the Animal Connection

Ray Pawley

Through a Zooman's Eyes.

Take a close look at both groups of zoo staffers that had their pictures taken with me after I gave the same lecture to both of them. Based on your intuition where in the world were these two pictures taken?

Smiles are, as we know, international. Even universal if we include some of those other kinds of creatures we choose to share our lives with--and often know us better than we know them.

Animals are a non-political thread that connects zoos and the people that work in them across the globe. People that work in zoos typically treat each other

and zoos in other countries as a single community regardless of whatever political differences may exist.

So where were these pictures taken?

Answer: One of the two groups consist of post-graduate students in Zoology under the auspices of Rob Carmichael's Wildlife Discovery Center at Elawa Farm, Lake Forest, Illinois. The other group consists of Zoo Volunteers.

The field study group is in Lake Forest, Illinois, participating in a wildlife inventory. The zoo volunteer group is in a classroom in Moscow Zoopark, Russia. Although I do not speak Russian the translator, Anastasia (in the turquoise sweater) was so expert at simultaneous

translation that we soon forgot we were speaking two different languages.

This brings me to an international political question: Why can't the nations of the world come closer together rather than push each other further apart? Zoos everywhere typically depend on, as well as, help each other, largely through shared goals that include protecting, breeding and managing animals. Animals and the visitors that come to see them are the primary connection that builds cooperation and strength between zoos in all corners of the world.

Even during times of extreme adversity such as wars, there were examples of animals coming first, by





relocating certain species and specimens to other zoos in safer locations and sometimes, it is rumored, across enemy lines.

In fact, I have a personal experience that happened soon after I arrived at Brookfield Zoo. I was giving a tour to one of the Schulz brothers of the animal collecting family from Okahandja, SW Africa. In the employees' staff corridor, we met up with our senior elephant keeper, Roy. The following exchange took place: Roy Woodruff: "Schultz! I thought you were shot down over Sicily." Schulz (with a smile): "Yah. But like a bad weed I am still here." Two warriors of similar age, one from the Allied side and the other a pilot in the Luftwaffe were seeing each other for the first time since before the war when they were in regular contact. They inquired about each other's families, swapped addresses and began updating each other about elephants—based on experiences learned by Schulz about the animals in the bush and by Woodruff working with the same animals in captivity. They shared a never-ending quest dedicated to making lifestyle improvements for all species, including these huge beasts. While they didn't shake hands, they smiled a lot and hoped to meet each other again some time.

On another occasion and at an international conference of Zoo Directors that took place when I last visited Moscow, both the Ukrainian and several Russian Zoo Directors were pledging their full support to each other, to maintain on-going working relations among their respective zoos in spite of whatever differences might arise in their respective country's national political interests.

The take-home message. Smiles are like lasers that can cut through many layers of resistance. If zoos can do it (and they always have) why not nations? 🐘

Smiles are like lasers that can cut through many layers of resistance.



HIGH OUTPUT UVB & HEAT

POWERSUN H.I.D. METAL HALIDE UVB LAMP & LAMP FIXTURE

- High output **UVB** lamp for larger habitats.
- Truly **SUN-LIKE BRIGHT NATURALISTIC LIGHT** for terrariums.
- **6500K** color temperature & **95 CRI** for amazing color combined with **UVB, UVA, & HEAT** from one lamp!
- Proprietary **ZOO MED** lamp construction creates a true flood-lamp effect, eliminating dangerous UV "hot-spots" common to many other metal halide reptile lamps.
- Full one year guarantee.



NANO FIXTURES & LAMPS

Nano lamp fixtures and lighting specifically designed for terrariums 10 gallons or smaller.



For more information regarding our Nano, Powersun H.I.D. or any of our other fine products, please visit our website below.



WWW.ZOOMED.COM



Enrichment Through the Ages

Micaela Muniz and Megan Smith, *Texas Wild! Arroyo Keepers*
Jennifer Elston, Ph.D., *Curator of Conservation and Behavior*
Fort Worth Zoo,
Fort Worth, Texas

Introduction

The value of enrichment in promoting the expression of natural behaviors in animals housed in zoos is well documented. Enrichment is often in the form of objects and toys to stimulate exploration, learning and play (Young, 2003), which is especially important for young animals. For animals in breeding programs, environmental enrichment can help enhance courtship and reproduction (Haislip, 2012; Unger and Elston, 2009). As advances in zoo medicine and nutrition evolve, animals in zoos are living longer and the health and welfare of animals moving into later life stages remains top priority (see *Animal Keepers' Forum* Special Dedicated Issue on the Care and Management of Geriatric Animals in Zoos, April/May 2009). As animals age, their behavioral needs and desires also change, and an enriched environment remains as important for the well-being of older animals as for younger animals. Enrichment opportunities that offer variety and novelty, with safety for the aging animal a key component, can help to keep the animals' minds active and alert. Access to objects and toys can promote activity and exercise which can help animals maintain healthy lifestyles. However, for some older animals, comfortable resting areas that are easily accessible, as well as access to bedding and additions that are designed to aid in movement, may take priority over toys designed for rigorous play.

Keepers in the Fort Worth Zoo's Texas Wild! section have taken care of many young animals, but also many elderly animals through the years, including bobcat (*Lynx rufus*), cougar (*Puma concolor*), jaguar (*Panthera onca*) and ocelot (*Leopardus pardalis*), and behavioral goals and accompanying enriching opportunities are adjusted accordingly. For example, keeper-constructed fire hose beds became favored enrichments for these aging felines that tended to sleep and rest for greater periods than when they were younger (Photo 1). Our ocelot preferred elevated locations for perching and resting, but as she got older it became clear that she needed some assistance moving between the levels within her exhibit. To keep these elevated sites available to her the team constructed sturdy ladders and placed them at different locations throughout her exhibit which helped her safely get from one level to another (Photo 2). Perfumes and synthetic animal urines sprayed on objects and exhibit structures and spices sprinkled within enclosures remain popular olfactory stimulants that continue to elicit investigative behaviors in our aging group (Photo 3).

Maya, a female Malayan tiger (*Panthera tigris jacksoni*), arrived at the Fort Worth Zoo in 1999 and had been residing in the Zoo's Asian Falls section. In October 2016 when Maya was 21-years-old she was moved off exhibit to a behind-the-scenes location in Texas Wild for her health and safety. Our team had a lot of experience caring for elderly felines, but we had not

Photo 1. Cougar on fire hose bed at the Fort Worth Zoo.



Photo 2. Ladder in ocelot exhibit at the Fort Worth Zoo.





Photo 3. Jaguar sniffing enrichment at the Fort Worth Zoo.

taken care of a tiger before. Maya's previous exhibit contained natural features such as soil, grass, trees and rocks. Her new home did not contain those natural elements, and it was up to us to continue to provide her with a stimulating environment. Even though Maya was now in "retirement" we were committed to finding ways to make her daily life enriching, but we needed to learn more about the types of things she would find enriching during this phase of her life. Our goal was to use objective measures to determine the kinds of enrichments Maya would interact with, including what she liked and didn't like, how she spent her time, and where she spent her time.

Methods

The team worked to develop creative enriching opportunities for Maya, with goal behaviors and safety as priorities. One of our goals for Maya was to offer her places where she could sleep or rest comfortably because these behaviors were expected to be highly desirable for a cat her age. Maya's enclosure contained an elevated platform that a younger feline would likely perch and rest on, however, the team did not expect her to utilize it due to its height off the ground. As alternatives, Maya was provided with two low-to-the-ground beds to use if she chose to sleep or rest in a location other than the floor. She could select which bed she wanted to sleep or rest on based on her own preference for each bed's location within her enclosure and the pliability of the structure's surface. One of the beds was made of woven fire hose attached to an elevated wooden frame. Due to her age, her keepers wanted to make sure she could easily access the bed so a wooden step was also attached to the bed to assist her in climbing into it. She could also rest her head on the step if she desired. The other bed was a wooden platform that was placed

Table 1. Ethogram used to document the behavior of Malayan tiger Maya during an enrichment study at the Fort Worth Zoo.

Behavior	Description
Contact enrichment	Touch novel item/food; includes rubbing, scratching, tossing, etc.
Drink	Ingest water
Eat	Consume diet in routine placement
Eat enrichment	Consume novel food or diet combined with object or hidden and discovered
Groom	Manipulate fur with tongue and/or paws
Investigate enrichment	View and/or approach novel object/novel food
Not visible	Behavior not observed
Other	Any behavior not defined (describe)
Pace	Walk back and forth in a repetitive pattern; must complete two full turns
Rest	Inactive while sitting or lying down
Sleep	Motionless with eyes closed
Sniff enrichment	Inhale through nose while oriented toward novel scent/object/food
Stationary	Inactive while standing
Travel	Movement from one location to another
Vocalize	Make sound
Location	Description
Fire hose bed	Structure constructed from fire hose
Floor	Concrete surface
Log	Natural stump or trunk
Platform	Elevated structure
Wooden bed	Structure constructed from wood

in a location that had full shade throughout the day. Maya was also provided with multiple large logs which offered scratching surfaces as well as structures to climb on.

Likely due to her age, Maya did not tend to chew on items and put herself at risk for ingesting undesirable materials as a younger cat might, so the team had some flexibility to offer a variety of objects for her to interact with. Since Maya was not housed on exhibit the keepers could incorporate some unnatural-looking items into her enrichment plan as well. Some examples included a basketball to bat and roll around, plastic bucket (no handles) to place her food in so she could discover it, cardboard boxes and large poster rolls for clawing and shredding, and a 55-gallon plastic drum to rub against and pounce on. The keepers also offered several kinds of natural items for her to explore, including large dried gourds, leaves, pine cones, and hay to use as bedding. She also had access to

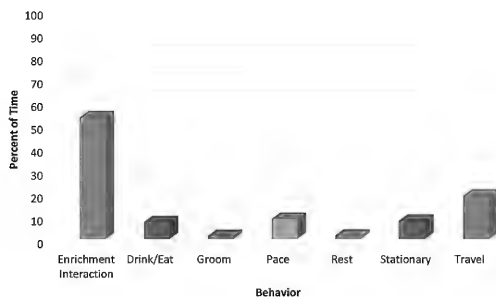


Figure 1. Behavior of Malayan tiger Maya during morning observation sessions at the Fort Worth Zoo (57 sessions; 4.75 hours).

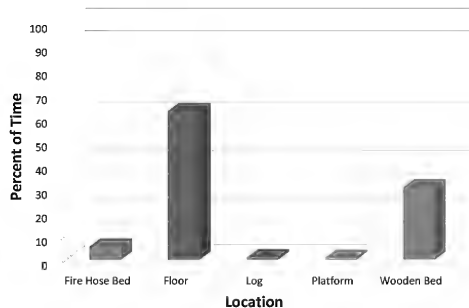


Figure 3. Location of Malayan tiger (*Panthera tigris jacksoni*) Maya during morning observation sessions at the Fort Worth Zoo (57 sessions; 4.75 hours).

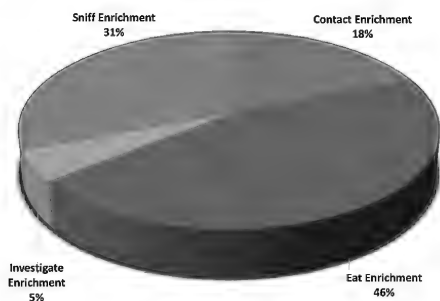


Figure 2. Proportion of enrichment interaction by Malayan tiger Maya during morning observation sessions at the Fort Worth Zoo (all enrichment interaction combined was 53% of her total activity).

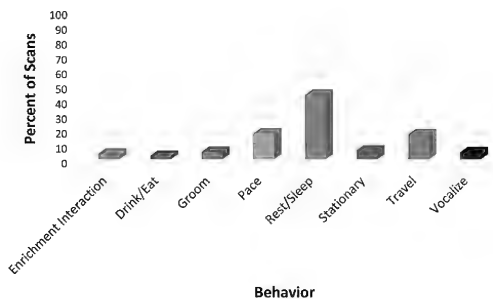


Figure 4. Behavior of Malayan tiger Maya during random scans throughout the day at the Fort Worth Zoo (506 total scans).

commercial toys such as a Boomer Ball®, Rocky Lou (Wildlife Toy Box) and Weeto (Otto Environmental). All enrichment items were monitored throughout the day for safety.

Once we developed our newly approved enrichment list for Maya we were ready to collect our data. First, we created an ethogram to describe the behaviors we expected to see and her location options (Table 1). Then, we observed and tracked her behavior and location using two methods. We knew that Maya was most active in the morning when she was shifted between enclosures for morning husbandry, so we began five-minute observation sessions each morning after she was shifted. During each session, we recorded her behavior and location at 30-second intervals (instantaneous sampling; Martin and Bateson 2007). This length of session worked well because it was long enough for us to record meaningful data but short enough that we could observe her uninterrupted and still have time for our other morning husbandry responsibilities.

Next, to track Maya's activity throughout the day we recorded her behavior and location during random scans between 0800

and 1600 hours. This method was also easily incorporated into our daily schedule because we could collect these data during our routine animal checks.

Because enrichment interactions can occur as discrete events, we realized that our day scans may not capture all the times when Maya was interacting with her enrichment. To help assess enrichment use we also made a few additional "spot checks" to note if an enrichment object had been moved from its original placement or was otherwise interacted with (e.g., object torn apart, etc.).

Results

Data were collected from November 2016 to February 2017. We documented Maya's behavior and location during 57 separate five-minute sessions for a total of 4.75 hours, and recorded 506 scans of her behavior and location throughout the day. We also made 12 separate enrichment-use "spot checks." To illustrate the full impact of Maya's enrichment use we combined enrichment categories (contact, eat, investigate and sniff) into one category: Enrichment Interaction.

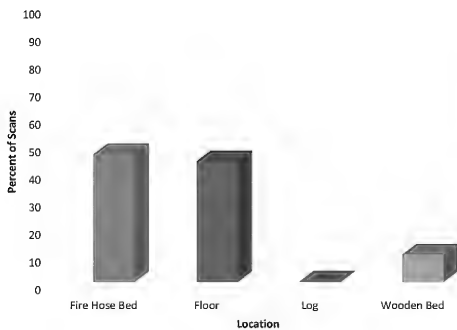


Figure 5. Location of Malayan tiger Maya during random scans throughout the day at the Fort Worth Zoo (506 total scans).

During the five-minute observation sessions Maya spent more than half of her time (53%) interacting with enrichment in some way (Fig. 1). When interacting with enrichment, Maya spent the most time eating her enrichment, followed by sniffing enrichment, contacting enrichment and investigating enrichment (Fig. 2). She did spend some time pacing, but no more than the amount of time she spent eating/drinking and stationary, and she engaged in routine travel more often than she paced. During the sessions, vocalizing and resting occurred infrequently and she was not observed sleeping. Also during these sessions, Maya spent most of her time on the floor, followed by her newly-constructed wooden bed and finally her fire hose bed (Fig. 3). She was rarely observed on the elevated platform or the large log.

During the day Maya spent most of her time sleeping and resting (43% of time; Fig. 4). She was located most often on her newly-constructed fire hose bed and the floor (Fig. 5). She was also periodically found on her wooden bed, but was rarely found on the log and not at all on the elevated platform. Maya did pace during the day, but she engaged in routine travel an equal amount of time. She also spent a similar amount of time performing normal, desirable behaviors (enrichment interaction, eating/drinking, grooming, and vocalizing). During daily scans, "other" behavior (urinating) was recorded only once.

All 12 "spot checks" revealed that Maya had interacted with the enrichment item that was offered every time (100% enrichment usage). This was evidenced by objects such as natural grapevine items, balls and other commercially-manufactured toys being discovered in other locations from where they were originally placed, feathers pulled out of objects, etc.

Discussion

In the mornings when Maya was shifted to an enclosure that had been provisioned with new enrichment opportunities, including various objects, toys and foods she did spend much of her time interacting with the enrichments (Photo 4). She



Photo 4. Tiger Maya with enrichment at the Fort Worth Zoo.



Photo 5. Tiger Maya with enrichment barrel at the Fort Worth Zoo.



Photo 6. Tiger Maya on fire hose bed at the Fort Worth Zoo.


spent more time traveling around on the floor to occupy herself with the enrichment opportunities available there than she spent on either of her beds. This indicated that despite her age she still maintained curiosity and the desire to explore and engage in new experiences. Maya seemed to be most interested in enrichment items that allowed manipulation of the item for a food reward or those items that had a specific scent associated with them. Keepers were pleased to see that Maya was very willing and able to manipulate items to receive a food reward such as a guinea pig or rabbit. Simple puzzle feeders such as rabbits inside of overturned buckets, shank bones hidden inside PVC tubes with a Boomer Ball® on top, and guinea pigs hidden underneath plastic tires on top of large barrels (Photo 5) were constructed to allow Maya to engage in her natural foraging and hunting instincts. Often Maya spent the entire five-minute observation session, occasionally longer, working through the mechanics of these feeding devices. When food was not involved, Maya appeared to enjoy new scents throughout her enclosure. She was often observed rubbing on items that had been sprayed with different perfumes or sprinkled with spices. Some of her favorite scents were body sprays and colognes as well as allspice and pumpkin spice.

It was not surprising that the random scans made throughout the day showed that Maya spent most of her time resting and sleeping. These are behaviors we would expect to see from an elderly tiger during the day. It was also not surprising that Maya spent little time on the elevated platform or log. These structures may not have offered the ease of accessibility (she would have had to climb or jump onto the platform) or stability (the log was narrow) preferred by a geriatric cat. To accommodate her desire for rest and sleep, Maya had her choice of beds and she did use them (Photo 6). Even though the active behaviors Maya engaged in first thing in the morning were not as frequently observed during the random scans, the spot checks revealed indirect evidence that Maya was indeed interacting with enrichments throughout the day and maintained an interest in doing so despite her age.

Conclusion

Animal keepers continuously adjust enrichment plans for animals throughout their lifetime based on behavior goals and preferences, and it is equally important to accommodate the behavioral needs and desires of animals that are transitioning into their golden years as it is for those that are in their youth. As demonstrated with Maya, there are always new ways we can enrich the lives of the animals in our care no matter their life stage, and help them retire in style.

Acknowledgements

We would like to recognize all our animals that have left an impression on our hearts and taught us so much about caring for animals in every stage of life. We thank Melissa Sooter, Texas Wild! mammal supervisor, and mammal curators John Ward, Stephanie Crowson and Kurt Giesler for support of this project. 

References

- Haislip, N. 2012. Hatching success of the Madagascar flat-tailed tortoise (*Pyxis planicauda*) at the Fort Worth Zoo. *Animal Keepers' Forum* 39(7):315-317.
- Martin, P., Bateson, P. 2007. *Measuring Behaviour: An Introductory Guide*, Third Edition. Cambridge University Press, New York, N.Y. 176 p.
- Unger, K., Elston, J. 2009. Successful *Ex-situ* Breeding of Lesser Flamingos (*Phoeniconaias minor*). Pp. 64-67. In: Childress, B., Arengo, F. and Bechet, A. (eds.). *Flamingo*, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group, No. 17, December. Wildfowl & Wetlands Trust, Slimbridge, UK.
- Young, R. 2003. *Environmental Enrichment for Captive Animals*. Oxford: Blackwell Publishing. 228 p.

ENRICHMENT OPTIONS REVIEW

From Muniz Smith Elston

This article highlights a situation that animal care staff at every institution encounters; aging animals. As the authors mention, animals are living longer because of the advanced care we can provide for them, so it is our responsibility to ensure our enrichment programs are comprehensive and incorporate an animal's age as well as medical issues. By applying their experience with previous aging animals, as well as new information about Maya's previous exhibit, the staff caring for Maya provided her with various species and age-appropriate opportunities. By collecting formal and objective data on Maya's activity and behavior, staff were able to continue providing her with opportunities that she indicated she enjoyed. Well done!

Trees For You and Me: What's that all about?

*Dawn Fleuchaus, Area Supervisor
Milwaukee County Zoo, Milwaukee, Wisconsin
Trees for You and Me Grant Coordinator*

Have you heard of the AAZK Trees for You and Me Program (TFYM)? We hope you have, but if you haven't, we hope this article will answer any and all questions you may have. Although not in the title, this program is really about Polar Bears (*Ursus maritimus*). Planting trees helps everyone, especially polar bears, by helping to mitigate climate change.

The AAZK TFYM program endows the AAZK TFYM Reforestation Grant to tree planting groups around the world. The Grant is awarded annually, with the money primarily being raised by AAZK Chapters and online donations! Local Chapters are encouraged to hold fundraising events and are limited only by their imagination. Fundraising is also achieved through the sale of merchandise, including new eco-friendly products, as well as an annual shirt sale featuring a unique TFYM logo. Over 70 Chapters have participated in fundraising events, with all donations pooled together to fund the annual Grant. The AAZK TFYM Reforestation Grant is awarded to a qualifying project/s that supports habitat restoration and/or climate change mitigation.

Simply put, local AAZK Chapters participate in a fundraising competition that helps trees get planted! Please check out the AAZK website <https://aazk.org/committee/trees-for-you-and-me/> to find out more about past competition winners, merchandise for sale and to find out more ways you can help.

Inspiration

The Trees for You and Me (TFYM) program was initiated by members of the Polar Bears International (PBI) Field Ambassadors program in 2009.

Spearheaded by Christy Mazrimas-Ott, the program goal is to mitigate the effects of climate change and conserve polar bears by supporting tree planting, thus reducing atmospheric CO₂.

TFYM Mission

The AAZK Trees for You and Me Program promotes the reduction of carbon emissions through education, fundraising, and support for reforestation efforts.

TFYM Vision

The AAZK Trees for You and Me Program will mitigate the effects of climate change, through the support of the TFYM grant recipients.



Evolution

The AAZK TFYM Program has seen some exciting changes over the past decade. Initially a collaboration between AAZK and Polar Bears International (PBI), funds raised supported tree planting projects through The Arbor Day Foundation with each \$1 raised = 1 Tree planted. TFYM then collaborated with PBI and

the Wisconsin Department of Natural Resources' Reforestation project to plant up to three Trees for every \$1 raised.

For the next three years, AAZK Chapters donated funds to a local, qualified tree planting project of their choosing with PBI awarding a tree to the top fundraising chapter. In its 7th year, the AAZK TFYM Restoration Grant was established by the AAZK Board of Directors. The AAZK TFYM Program committee was formed and PBI matched \$500 for the top fundraising Chapter.

The AAZK TFYM Program has expanded to include an annual T-shirt fundraiser, featuring a special design, created by Peppermint Narwhal. In 2019, TFYM products became available through the AAZK website <http://aazk.org/products-category/merchandise> and the new TFYM Infographic was created. Members of the TFYM team also take part in the AAZK Annual Conference. Look for our info table, products, Trivia/Rally/Conservation Challenge and posters or papers by TFYM grant recipients! Through this program's evolution, it has become an established AAZK National Program; similar to AAZK's Bowling for Rhinos Program.

TreeBlitz

TreeBlitz is a mini fundraising competition that recognizes and awards the AAZK Chapter which raises the most money between February 1 and April 1. February 27 is International Polar Bear Day and the focus during TreeBlitz. Running through April, TreeBlitz gives local Chapters a chance to get the jump on the fundraising competition. In the past, the leading Chapter at the conclusion of the Treeblitz received

Meet the TFYM Program Members

Christy Mazrimas-Ott
Program Manager
(Brookfield Zoo)

Amy Baxendell-Young
Events Coordinator
(Canadian Polar Bear Habitat)

Tanya White
Communication Liaison
(Maryland Zoo)

Meryt Schumacher
Conference Liaison
(Denver Zoo)

Dawn Fleuchaus
Grant Coordinator
(Milwaukee County Zoo)

Sara Bjerklie
Board of Directors Oversight
(Dallas Zoo)

Want to join the TFYM Program committee?

We currently have a vacancy for Vice Manager. If you are motivated, inspired, driven, conscientious, and hardworking or just want to get involved with a conservation program contact the AAZK TFYM Program at tfym@aazk.org.

Why should you support the TFYM Program

To help conserve the sea ice that Polar Bears depend on!

To help mitigate the global effects of climate change!

To help your local AAZK Chapter win the TreeBlitz and fundraising competition!

To hold and attend awesome events!

To educate others about the plight of polar bears and how they can get involved!

To get cool TFYM eco-friendly products!

To support the planting of trees to help 1000's of species!



Plant sales can be used to support TFYM.

a commemorative tree and currently receives a \$500 matching donation from PBI. Congratulations to the Columbus Zoo AAZK Chapter for winning the 2019 TreeBlitz with \$5163.55 raised for TFYM by April 1, 2019. The Columbus Zoo AAZK Chapter went on to win the 2019 overall fundraising competition too! Starting in 2021, a new incentive will be announced, giving one lucky Chapter member extra chances to win a once in a lifetime opportunity! Stay tuned to learn more about this exciting opportunity.

Events

AAZK Chapters have held some fantastic TFYM fundraising events. There is no limit to what can be done to support the TFYM mission and tree planting grant. Events can be held at any time of year and Chapters can hold multiple events. Here are some of the TFYM event ideas our Chapters have come up with: Art sale or Auction, Dunk tank, Fun Run, Craft Fair, Nighttime Walk/Event, Bake Sale, Polar Plunge, Miniature Golf Event, Garage Sale, Silent Auction, Spaghetti Dinner, Car Wash, Recycling Program, Night out at your local hang out that allows a 50/50 raffle fundraiser, Bingo, Plant Sale, Brewery Fundraiser, Painting Event, Shirt Sale, Red Bubble Sale.

AAZK TFYM Restoration Grant /Making a Difference Worldwide

Planting trees doesn't just help polar bears! Projects supported by the AAZK TFYM Grant help to reduce the effects of

climate change worldwide. This means that hundreds or even thousands of species benefit from the AAZK TFYM grant. There are many activities that take place to raise funds for the Grant, but the real magic happens when that money goes directly into a tree planting project. Grant recipients in the past have focused on restoring and expanding habitat and creating corridors for many species including Golden Lion Tamarins, Red Pandas, Sandhill Cranes, and all the other wildlife that live within their habitats.

The 2019 TFYM grant was just awarded to two worthy projects. Wes Shaffar was awarded funds to support work with the National Forest Foundation on Longleaf Pine Expansion and Carbon Sequestration. Kali Becher was awarded funding for Restoration of upland forest and native meadow at Yaak Mountain and Wild River with the Vital Ground Foundation.

To apply for the AAZK TFYM Reforestation Grant, please visit the AAZK website. The amount of funding available each year varies depending on the total amount raised by local Chapters, products sales, and donations. Grant recipients need not be an AAZK member, but must work with a 501(c)(3) nonprofit organization or an International Registered Charity. AAZK TFYM grant applications are reviewed and scored by the AAZK Grants Committee with the TFYM program members serving in an advisory role. If you know of a worthy tree planting project, please pass along the grant application information and encourage all qualifying projects to apply.



Craft fairs and art auctions can be used to support TFYM.



Tree planting at Milwaukee County Zoo

Looking to the Future

AAZK TFYM has evolved greatly since its inception in 2009 with the framework now well established. This is not to say that there isn't room for improvement or further growth. The year 2020 will see the TFYM team begin planning for an exciting new addition to the Program. In 2021, we will kick off an added incentive to fuel the fundraising competition. Each participating Chapter will have the opportunity to nominate a representative for a once in a lifetime opportunity, sponsored by Polar Bears International. Watch for more details and start planning those TFYM events! 🐻

Trees For You and Me (TFYM) Annual Calendar

February 1	Treeblitz Begins
February 27	International Polar Bear Day
April 1	Treeblitz Ends
November 1	Fundraising Deadline
November 15	Grant Application Deadline
December	TFYM Grant Awarded
AAZK Annual Conference	TFYM Swag, Activity and Info Table
Year Round	AAZK Chapter TFYM events
Year Round	TFYM products for sale at www.aazk.org
Year Round	Donate to TFYM at www.aazk.org

Trees for You and Me

The AAZK Trees for You and Me Program promotes the mitigation of the effects of climate change through education and fundraising efforts. A forest-based carbon offset grant is offered to support projects geared towards habitat restoration and the reduction of carbon emissions.

70 CHAPTERS
have participated in fundraising for the Trees for You and Me grant!



PLANT TREES for...

- Arctic sea ice is melting away due to climate change. Polar bears need the ice as a platform to hunt seals, breed, and for pregnant females to den.
- Carbon dioxide (CO₂) is the main greenhouse gas contributing to climate change. Trees absorb CO₂ naturally, which helps mitigate the effects of climate change globally.

POLAR BEARS!

Grant winning projects have helped plant **100,000-150,000** trees!

Those trees help remove approximately **7,200,000** pounds of CO₂ from the atmosphere per year!




MORE THAN JUST POLAR BEARS!

Trees for You and Me has helped many other species including:

sandhill cranes, red pandas and golden lion tamarins.





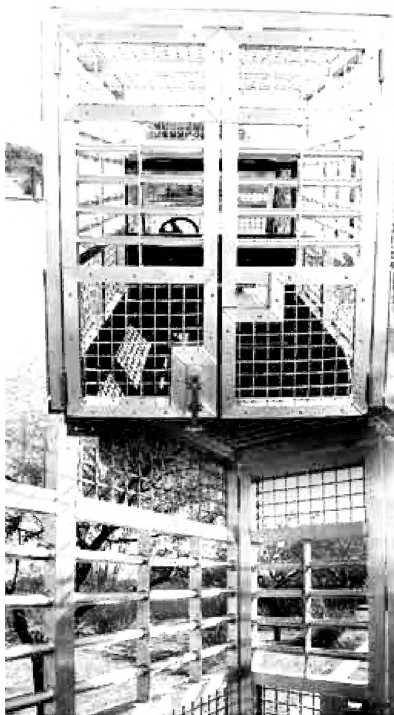

**AMERICAN ASSOCIATION
of ZOO KEEPERS**

FIRST RESPONSE CART[®]



Golf cart, completely customized by A Thru Z, including design, fabrication, and installation.

Innovative, multi-functional, emergency response vehicle for Reid Park Zoo. Secure, animal/keeper transport.



8620 E. Old Vail Rd., Ste. 100 Tucson, AZ 85747

Ph: 520.434.8281 | Fax: 520.434.0151

Email: info@athruz.net | Website: <http://www.athruzcad.com>

A Thru Z
CONSULTING & DISTRIBUTING, INC.



Spring is finally here, and park attendance is building.

Let us help keep your animals happy and healthy with one of the largest selections of enrichment in the world.



Helping Professionals Mold Enrichment



2401 Phoenix Ave NE
Albuquerque NM 87107
www.wildlifetoybox.com

A Proud Product Line of Desert Plastics

Ph: 866.793.0376

E-mail: sales@wildlifetoybox.com



8476 E. Speedway Blvd.
Suite 204
Tucson, AZ 85710-1728
U.S.A.

"Dedicated to
Professional Animal Care"



facebook.com/AAZKinc



@AAZKinc

Sound Nutrition for Nature's Royalty



Central Nebraska Packing, Inc. offers:
Classic & Premium Frozen Carnivore Diets

• ALSO AVAILABLE •

HORSE SHORT LOINS / HORSE & BEEF BONES
MEAT COMPLETE WITH TAURINE (RAW MEAT SUPPLEMENT FOR ALL CARNIVORES)

MEMBER: AZA | AAZV | AAZK



877.900.3003 | 800.445.2881

P.O. Box 550, North Platte, NE 69103-0550
info@nebraskabrand.com • nebraskabrand.com

FELINE & SENIOR FELINE | BIRD OF PREY | CANINE | SPECIAL BEEF FELINE